How can gender discrimination explain fertility behaviors and family-friendly policies?

Magali Recoules

How Can Gender Discrimination Explain Fertility Behaviors and Family-friendly Policies ?

Abstract

This paper focuses on the interaction between gender discrimination and household decisions. It develops a model with endogenous fertility, endogenous labor supply and endogenous size of government spending. Family policies which concern childcare services are assumed to reduce the time that parents spend on their children. The model shows that gender discrimination may explain differences in household decisions between countries. The solution shows a U-shaped relationship between fertility and gender discrimination if the quality of childcare services is sufficiently high. In the decreasing part of this U-shaped curve, a decrease in the discrimination level implies a related increase in fertility, women's participation in the labor force and in family-friendly policies.

Keywords: Gender discrimination, Fertility, Labor supply, Public policies

JEL Classification: D13, H31, J13, J71

Introduction

Since the middle of the 1980s empirical studies have shown an inversion of the cross-country correlation between the female labor supply and the fertility rates in OECD countries (Ahn and Mira (2002)). Now, the countries exhibiting the lowest levels of female employment are also those that have low fertility rates, and the countries that are characterized by the highest levels of female employment are also those that have high fertility rates. Some authors propose to explain these features by changes in institutional context, such as labor market arrangements and family-friendly policies (Adserà (2004); Brewster and Rindfuss (2000)).[1] Family-friendly policies differ considerably from country to country both in their type and their extent. In particular, the countries with both high fertility and female employment are also those that have high state intervention concerning family (Del Boca and Locatelli, (2007)).

How can such differences in household decisions as family-friendly policies, fertility and the female labor supply, be explained? My paper proposes an explanation based on gender discrimination in the labor market. In particular, this paper studies the way in which gender discrimination affects the related decisions on fertility, the female labor supply and family policies. Labor market discrimination, by reducing the wage of women, influences household decisions through three direct effects. A rise in gender discrimination leads to both an increase in the specialization of women in household activities and to a decrease in the child-rearing opportunity cost in terms of earnings, as well as a decrease in the total household income. The two former effects play in favor of fertility, while the latter tends to reduce it. Moreover, the joint decrease in household income and the opportunity cost of children tends to reduce the willingness to pay for family-friendly policies which finance childcare services. By combining the effects of discrimination through shifts in female wage and in size of public spending, the model provides a U-shaped relationship between fertility and gender discrimination. If the discrimination is not too high, a drop in gender discrimination leads to a related rise in fertility, the female labor supply and family policies.

This paper is based on three crucial assumptions. First, that there is gender discrimination in the labor market that leads to a gender wage gap. Thus for the same skills and working time, women receive a lower wage than men because of gender discrimination. In the literature, gender discrimination partly accounts for the gender wage gap (Becker

1. Jaumotte (2003) studies the factors determining the female labor supply in OECD countries and finds that public spending in child care stimulates female employment. Addio and Mira d'Ercole (2005) study the determinants of fertility and find that OECD countries characterized by wider childcare availability and lower direct costs of children, have higher total fertility rates.

(1957) ; Aigner and Cain (1977); Coate and Loury (1993); Francois (1998)) and thus for the differences in child-rearing opportunity cost between spouses. Secondly, there is a childrearing technology which relates the time cost of rearing children with public policies. The efficiency of this technology plays an important role in fertility decisions. The cost of having children is affected by discrimination through two ways: shifts in female wage and in the size of family-friendly policies.[2] Finally, family-friendly policies are assumed to be endogenously determined through a vote of agents.

The economy is composed of men and women organized as couples. Each man and woman having the same preferences, all households are identical. Household decisions are determined through a two-stage decision process. The first stage refers to the size of public spending, more specifically the taxation level which is determined through a vote of agents. Each member of the couple singly chooses the taxation level that maximizes his or her indirect utility. The second stage refers to fertility, labor supply and individual consumption choices. These decisions are taken cooperatively within the couple and result from the maximization of a weighted sum of spouses' utilities under a household budget constraint, the weights being the bargaining power of each partner.

The model shows that different intensities of gender discrimination may explain the differences in household decisions across countries. Gender discrimination, by acting on the female wage, modifies the allocation of tasks within the household and implies a specialization of gender roles. An increase in gender discrimination discourages the participation of women in the labor market which implies a decrease in the childrearing opportunity cost in terms of earnings as well as a reduction of the household income. By staying at home for longer, women's demand for public services decreases and agents vote for a lower tax rate that boosts the childrearing opportunity cost in terms of time. So a rise in discrimination has ambiguous effects on the overall cost of having children. If the efficiency in childrearing technology is sufficiently high, the solution of the model shows a U-shaped relationship between fertility and gender discrimination. For a low level of discrimination, an increase in discrimination raises the overall cost of having children and puts off the childbearing decision as the opportunity cost in terms of earnings is dominated by the other effects. Beyond a discrimination threshold the opportunity cost in terms of earnings outweighs the other effects and reduces thereby the overall cost of having children. In this case, an increase in discrimination pushes households to have more children. Hence in the first part of the U-shaped curve, a drop in the discrimination level

2. Apps and Rees (2004) find that both women's employment and fertility are higher in countries with individual rather than joint taxation, and in countries which help households through child care services rather than child payment.

implies a related rise in fertility, women's employment and family policies. This relation matches empirical evidence observed in European countries. Beyond a discrimination threshold, agents choose a tax rate equal to zero since the gains given by public policies are not enough to offset their costs. In this case, the effect through shifts in female wage always prevails and a rise in discrimination stimulates fertility decisions.

The model presented is based on Cavalcanti and Tavares (2010) and Galor and Weil (1996) in which the gender wage gap is due to differences in physical strength and reduces as the economy grows. The current paper suggests that gender wage discrimination be related to cultural behaviors which may contribute to explain the persistence of gender wage gap and differences in European household decisions. In particular, this paper focuses on the way in which gender discrimination may explain the positive relation between fertility, female labor supply and family-friendly policies, while Cavalcanti and Tavares (2010) are mainly interested in the link between the female labor supply and the level of public spending. The paper shows a U-shaped relationship between fertility and gender discrimination. Thus, a decrease in gender discrimination may lead to a joint increase in fertility, female labor supply and family-friendly policies.

The paper is structured as follows. Section 1 provides an overview of some empirical evidence regarding fertility rates, labor supply and family policies in OECD countries. In Section 2, a general equilibrium model with gender discrimination is developed. Section 3 presents the main results. Section 4 concludes.

1 Some empirical evidence

Since the inversion of the cross-country correlation between fertility and the female labor supply in the middle of the 1980s, OECD countries with the lowest levels of female employment are also those that have low fertility rates (Bettio and Villa (1998)). And the countries with the highest levels of female employment are also those that have high fertility rates (see Figure 1). In other words, a positive relationship occurs between these variables which is represented in Figure 2. It also seems that there is a positive relationship between the female labor supply and family-friendly policies in OECD countries (Del Boca and Locatelli (2007)).

This result leads to think that in countries in which it is relatively easy for women to work and to have children, female employment and fertility both tend to be higher. Indeed, European countries which have the highest levels of fertility rates and female labor supply are also those that have high state intervention concerning the family. Family policies, by influencing the cost of having children, modify family behavior in terms of

female employment and fertility (Addio and Mira d'Ercole (2005)). Hence, countries can be gathered into different clusters according to their respective behaviors in terms of the fertility rate, women's labor force participation rate and social policy (Chesnais (1996) and Hantrais (1997)).[3]

In a cross-country comparison, factors such as labor market institutions (Adserà (2004)) or cultural attitudes (Fernandez et al. (2004)) may influence these decisions. Here the analysis focuses on the role played by gender discrimination. Gender discrimination by acting on wages may be one explanatory factors of differences in household decisions across European countries. To illustrate this assumption, family decisions in a set of European countries have been employed. An indicator of gender discrimination has been selected: the percentage of the gender wage gap which is unexplained by differences in characteristics between men and women (see Table 1).[4]

As this paper focuses on the effects of gender wage discrimination on household decisions the gender discrimination indicator, "the part of the gender wage gap unexplained by gender differences in characteristics", has been employed to study the relationships between household decisions and gender discrimination. Figures 3(a) to 3(d) give an insight of the kind of relationship that the theoretical model will try to match. They show, overall, a negative relationship between household decisions and the gender discrimination index. First, not surprisingly we find that a high degree of discrimination has a negative effect on female participation. This effect persists if female full-time equivalent employment or employment of women with two or more children are taken into account (Figures 3(a) and 3(b)). Second, Figure 3(c) shows a decreasing relationship between fertility and gender discrimination, while traditionally it is expected that discrimination has a positive effect on fertility decisions by reducing female wage and thus the partici-

3. Some authors have organized countries in clusters according to their respective behavior concerning family policies. For example, according to the classification proposed by Gauthier (2002), the ten European countries of Table 1 could be divided into three groups. The first includes Denmark, while the second includes France, the United Kingdom, Austria, Germany and Ireland. And the last would comprise the Southern European countries. We can see that this classification matches that of the discrimination index in Table 1.

4. This index has been computed for the year 2000 and is taken from Meurs and Ponthieux (2005) (Table A3). They analyze the composition of the gender wage gap by dividing it into the gap due to characteristics and that due to returns for these ten European countries. The index which represents the part of the gender wage gap which is unexplained by differences in characteristics corresponds to the gap due to returns divided by the total gap. The sample studied, in the current paper, is limited to that of Meurs and Ponthieux, as it is difficult to procure the first discrimination index for many countries.

In Table 1, as in Portugal the unexplained part is larger than the total gap, the first discrimination index is higher than 100 % . This seems to show that female workers have on average higher productive characteristics than male workers.

pation of women in the labor market (Del Boca and Locatelli (2007)). Hausmann et al. (2009) find that reducing gender inequalities may tend to increase fertility (see Figures 4(a) and 4(b)). [5] Taking into account the traditional positive effect of discrimination on fertility and the negative effect observed in Figure 3(c), a U-shaped relationship between fertility and gender discrimination may be considered. This U-shaped relationship can result from the existence of childcare services in countries. Finally, Figure 3(d) points out a negative effect of discrimination on family-friendly policies. Here the family-friendly policies correspond only to government family spending on services as percentage of GDP (e.g. childcare services). So childcare services may influence fertility decisions which are both influenced by gender discrimination. To sum up, the data seem to show that gender discrimination has a negative effect on these three outcomes.

2 The model

The relationship between family decisions and gender discrimination is studied through a general equilibrium model with endogenous fertility, labor supply and size of government spending. The framework of the model is based on Galor and Weil (1996) and Cavalcanti and Tavares (2010). The latter introduces public spending to the model of Galor and Weil (1996). The economy is composed of men and women organized as couples and the level of family-friendly policies is endogenously determined by the vote of agents. Family policies are assumed to reduce the time that parents spend on their children.

In the economy there are two types of agents: firms and households.

Firm

Firm decision. All firms are identical. The production technology uses one production factor, labor. There are two kinds of worker, female workers, L_f, and male workers, L_m, which are perfect substitutes. The marginal productivity of men and women is the same. The production function is,

$$f(L_f + L_m) = A(L_f + L_m) \tag{1}$$

where $A > 0$ is the total productivity of factors.

5. Using the gender inequalities index developed by Hausmann et al. (2009) for developed and developing countries, Figure 4(a) shows a U-shaped relationship between fertility and gender inequalities. Figure 4(b) points out a negative relationship between fertility and gender inequalities in the selected countries of Section 1 for which the gender inequalities index is available; Denmark, Greece, Ireland, Italy, Portugal, Spain and The United Kingdom.

Given the technology and the input prices, the representative firm chooses inputs in order to maximize its profits.

$$\max_{L_f, L_m} \Pi(L_f, L_m) = f(L_f, L_m) - w_m L_m - (w_f + d) L_f \tag{2}$$

Here the parameter d captures the problem of discrimination and can be interpreted as the taste for discrimination of employers as in the discrimination theories based on discriminative preferences pioneered by Gary Becker (1957).[6] The problem of firm disappearance is avoided, as all firms are similar. Competition between firms will not lead to the disappearance of certain firms.

The first order conditions associated with the representative firm's problem are:

$$w_f = A - d \quad \text{and} \quad w_m = A, \quad \text{with} \quad d \in [0, A[\tag{3}$$

As this model takes place in an economy in which men and women have the same level of human capital, d represents the wage gap between men and women per hour worked for the same skills. Thus it determines the level of gender discrimination in the labor market.

Discrimination. In the model, a taste-based discrimination in line with Becker (1957) is considered for two main reasons. Empirical evidence of taste-based discrimination from employer against women have been found in Hellerstein et al. (1999) and Hellerstein et al. (2002). Another explanation in favor of this choice is that the gender wage gap may be explained by attitudes towards women's participation in the labor market. That is related to beliefs concerning the appropriate role of women in society. Chichilnisky and Hermann Frederisken (2008) find a relation between persistence of a gender wage gap and persistence of gender roles consideration, which may be directly linked to the attitude towards working women. This idea may be illustrated for example by the bad perception of working mothers in Germany, who are viewed as "mother-crow" (Fagnani (2002)). The perception of men towards the participation of their wife in the labor market reflects what they will feel concerning female employees if they are employers.[7] Employers may consider that women should stay at home to take care of children and by employing a

6. It is assumed that the gain of employed a woman rather than a man is equal to the psychological cost of the employer. So the representative employer employs both female and male workers. For a survey of gender discrimination theories see Altonji and Blank (1999); Havet (2004).

7. Fernandez et al. (2004), analyze the evolution of attitudes of husband towards participation of their wifes to the labor market to explain changes in female labor supply.

woman, employers will suffer from a disutility. By assuming that employers suffer to employ women taste-based discrimination takes these feelings into account.

Household

Timing of decisions. Agents are living one period during which they make decisions in two steps. First, agents vote on the taxation level which will be used to finance family-friendly policies. These policies concern childcare services which allow for a reduction of childrearing time of parents.[8]

In a second step, given the government spending, spouses make fertility, labor supply and individual consumption choices. These decisions are the result of the maximization of a weighted sum of individual utilities under the household budget constraint. In the maximization, the weights are the bargaining power of each spouse. These decisions will be noted as intra-household decisions.

This problem is solved by backward induction. The second step allows the determination of individual utilities in terms of public spending, and the first step determines the extent of public spending in the society.

Second step: Intra-household decisions. All households are identical in this society. Each agent has one unit of time which is divided between child care and paid work,[9] and has the same level of human capital.

The preferences of spouses are assumed to be the same and are represented by the following utility function:

$$U_i = \beta \ln(c_i) + \gamma \ln(n) \quad \text{s.t} \quad i = f, m \tag{4}$$

where n is the number of children per couple, c_i the individual consumptions and $\gamma+\beta = 1$.

The budget constraint of the household is

$$[w_f(1-h_f) + w_m(1-h_m)](1-\tau) = c_f + c_m, \tag{5}$$

where h_i s.t $i = f, m$ is parents' time spent on parental care and child-rearing, and τ is the tax rate. Notice that prices of consumption goods are normalized at one.

8. The assumption of tax rate determination through a vote of agents is closed to the one of Apps and Rees (2004) in which they assume that households choose the price of childcare services, but in the current paper this decision is made individually.

9. The leisure is not introduced in the utility function as some recent studies show that men and women allocate pretty much the same time to leisure (Burda et al. (2007); Freeman and Schettkat (2005)).

The time allocated by parents to their children is

$$H = nh(g) = h_f + h_m \tag{6}$$

where $h(g)$ represents the total time devoted by parents to each child. The time allocated by one parent to children is assumed to be a perfect substitute of the other parent's time.

In this model, government policies have an influence on household decisions through the childrearing technology function:

$$h(g) = \phi[1+g]^{-\varepsilon} \tag{7}$$

where $\varepsilon > 0$ and ϕ is the minimal time that parents have to devote to each child. More specifically, ϕ represents the time cost of children for parents when there is no public spending. The parameter ε captures the efficiency of family policies. Public revenues are collected by the government through a proportional tax τ on household income. The government budget is balanced and taxes are employed to finance the per-couple government spending, g, intended to decrease the per-child cost of rearing children.

The couple's program for intra-family decisions is

$$\max_{c_f, c_m, n, h_f, h_m} \theta[(1-\gamma)\ln(c_f) + \gamma\ln(n)] + (1-\theta)[(1-\gamma)\ln(c_m) + \gamma\ln(n)] \tag{8}$$

$$\text{s.t.} \quad [w_f(1-h_f) + w_m(1-h_m)](1-\tau) = c_f + c_m \tag{9}$$

$$n = \frac{h_f + h_m}{h(g)} \tag{10}$$

where θ is the bargaining power of the wife.

Notice that the opportunity cost of child-rearing is higher for men than for women, because of $w_f < w_m$. Due to gender discrimination, there is a specialization of gender roles within the couple based on comparative advantage and budget constraint (5). In the household only the woman takes care of children and the man spends all his time on the labor market.[10]

$$h_m = 0 \quad \text{and} \quad nh(g) = h_f \tag{11}$$

Based on gender specialization, the couple's program becomes

$$\max_{c_f, c_m, n, t_f} \theta[(1-\gamma)\ln(c_f) + \gamma\ln(n)] + (1-\theta)[(1-\gamma)\ln(c_m) + \gamma\ln(n)] \tag{12}$$

10. As this paper focuses on female labor supply decisions and their relation with discrimination, the case in which the time cost of children is very high such as $h_m > 0, h_f = 1$ is not reproduced.

$$\text{s.t.} \quad [w_f t_f + w_m](1-\tau) = c_f + c_m \tag{13}$$

$$1 = t_f + nh(g) \tag{14}$$

where t_f is the time spent on the labor market by the woman and Equation (14) represents a woman's time constraint.

The *woman's labor supply* is given by

$$t_f = 1 - \frac{\gamma(w_f + w_m)}{w_f} \tag{15}$$

A high tax rate has two effects on labor supply decisions: it discourages the labor supply of the household but it also reduces the opportunity cost of child-rearing and increases women's labor force participation. Due to the proportional form of the tax rate and the joint taxation of spouses within the household, the substitution effect and the income effect cancel each other out.[11]

The *fertility choice* is

$$n = \frac{\gamma(w_f + w_m)}{w_f h(g)} \tag{16}$$

The number of children is limited by the time constraint of women and depends on household income. It is also a decreasing function of women's child-rearing opportunity cost, $w_f h(g)$. For a given level of public spending, an increase in discrimination which implies a drop in female wage, w_f, has a positive effect on fertility decisions.

The *individual consumption decisions* are

$$c_f = \theta(1-\gamma)[w_f + w_m](1-\tau) \qquad c_m = (1-\theta)(1-\gamma)[w_f + w_m](1-\tau)$$

and depend on total available income and the tax rate.

Thus intra-family decisions are expressed in relation to government spending.

First step: Tax rate determination. We can now turn at the first step during which each partner singly votes on the optimal level of public spending, taking into account its effects on the women's trade-off between the labor market and child-rearing. The chosen taxation level will be used to finance family-friendly policies.

11. If a lump sum tax is considered the substitution effect outweighs the income effect. And the tax rate has a positive effect on female labor supply. Moreover, recent studies have pointed out that the labor supply elasticity is higher for women than for men and so the former should be less taxed than their partners (Alesina et al. (2007)). If gender specific tax rates are introduced, the substitution effect prevails on the income effect and an increase in tax rate allows for a rise in female labor participation. The higher the male tax rate, the lower this effect.

The budget of the government is balanced throughout and is defined as

$$g = \tau(1-\gamma)(w_f + w_m) \tag{17}$$

, where τw^m is the tax on the husband's paid work and $\tau w_f(1-h(g)n)$ is the tax on the wife's paid work.

Each partner singly fixes the tax rate which maximizes his/her expected indirect utility,

$$\max_{g_i} V_i = (1-\gamma)\ln[c_i(g_i)] + \gamma \ln[n(h(g_i))], \quad i = f, m \tag{18}$$

The preferred tax rate of agents is given by the following expression[12]

$$\tau_i = \frac{\gamma\varepsilon}{\gamma\varepsilon + (1-\gamma)} - \frac{1}{(w_f + w_m)(\gamma\varepsilon + (1-\gamma))}, \quad i = f, m \tag{19}$$

Men and women choose the same level of tax rate. There is a consensus concerning the expected tax rate in society. The tax rate is positively linked with household income. The extent of the tax rate also depends on the relative preferences of spouses for children and on the public spending efficiency. The lower the female wage, the higher the tax rate. Finally, if wages are relatively high, the higher the preferences for children, the higher the tax rate.

Before examining the equilibrium, some intermediate results are:

$$w_m = A, \quad w_f = A - d, \quad L_f = t_f \quad \text{and} \quad L_m = t_m$$

where w_m, w_f, L_f, t_f, L_m and t_m are respectively male wage, female wage, women's labor demand, women's labor supply, men's labor demand and men's labor supply.

All decisions such as fertility, labor supply, individual consumptions and public spending depend on both discrimination, d, and preferences.

Implications of gender discrimination

At the equilibrium, two solutions could be identified by different gender discrimination levels. An interior solution characterized by a positive tax rate, $\tau > 0$, and a corner solution specified by a tax rate equal to zero, $\tau = 0$ if $A > d > 2A - \frac{1}{\gamma\varepsilon}$.

Interior Solution. If $d < 2A - \frac{1}{\gamma\varepsilon}$, the marginal gain given by public spending compensates for the marginal cost of the latter and adults vote for a strictly positive tax rate,

12. For intermediate results see Appendix A.

$\tau > 0$.

The *tax rate*,

$$\tau = \frac{\gamma\varepsilon}{\gamma\varepsilon + (1-\gamma)} - \frac{1}{(2A-d)(\gamma\varepsilon + (1-\gamma))} \tag{20}$$

is a decreasing function of gender discrimination, $\frac{\partial \tau}{\partial d} < 0$ and so the higher gender discrimination, the smaller the tax rate. Moreover, the condition under which the tax rate τ is positive could also be analyzed as an efficiency constraint concerning the childrearing technology which is related to family policies, and thus a constraint on ε. In this way, if the welfare services offered by the state are too low, the voters choose a low tax rate. The efficiency condition required for the existence of public policies depends on the relative preferences of agents such that the higher the preferences for consumption, the lower the condition.

The *number of children chosen by the couple* is given by

$$n = \frac{\gamma(\gamma\varepsilon)^{\varepsilon}(2A-d)[1+(1-\gamma)(2A-d)]^{\varepsilon}}{\phi(\gamma\varepsilon + (1-\gamma))^{\varepsilon}(A-d)} \tag{21}$$

Proposition 1 *There is a U-shaped relationship between fertility and gender discrimination if* $\varepsilon > (1 + \frac{1}{2A(1-\gamma)})$. *If this condition is not satisfied, the fertility decision is an increasing function of gender discrimination.*

Proof. See Appendix B ■

The way gender discrimination affects fertility decisions depends on the efficiency of public spending. The efficiency condition required for a U-shaped relationship between fertility and discrimination is a decreasing function of relative preferences for consumption: the higher the preferences for consumption, the lower the condition.

To get a better understanding of this U-shaped relationship the effects through which discrimination affects fertility decisions can be presented. By changing woman's opportunity cost of child-rearing, $h(g)w_f$, discrimination leads to two price effects. The direct price effect implies that a drop in female wage, w_f, due to a higher discrimination level, reduces the child-rearing opportunity cost in terms of earnings. This effect has a positive impact on childbearing choices. The indirect price effect comes from changes in the woman's opportunity cost in terms of time, $h(g)$. A higher discrimination level leads to less public spending and increases in turn the woman's opportunity cost in terms of time. This has a negative impact on the fertility choice.

Finally, an increase in discrimination also implies an income effect which can be set

out as follows. A higher discrimination level reduces the female wage[13] and therefore the household income. Having children is costly, a reduction of the household income discourages the couple from having more children.

To sum up, firstly if the level of gender discrimination is sufficiently low, the negative effects prevail and a higher gender discrimination level discourages the fertility choice, $\frac{\partial n}{\partial d} < 0$. Notice that this negative relation exists only in the decreasing part of the U-shaped curve. Countries of the sample presented in Section 1 except Greece and Portugal are in this part of the curve. However, when the discrimination is beyond a certain threshold the positive effect outweighs the negative effects and the childbearing decision becomes an increasing function of the gender discrimination. This corresponds to the traditional positive effect of discrimination on fertility.

The *woman's labor supply* is given by

$$t_f = 1 - \frac{\gamma(2A-d)}{(A-d)} \tag{22}$$

and is negatively correlated with the gender discrimination level, $\frac{\partial t_f}{\partial d} < 0$.

If $\varepsilon > (1 + \frac{1}{2A(1-\gamma)})$ in the decreasing part of the U-shaped curve a decrease in discrimination leads to a joint increase in fertility and female labor supply as it has been observed in the first section.

Individual consumptions are also negatively correlated with the discrimination level. A higher gender discrimination level reduces the household income for a given working time and decreases individual consumptions,

$$c_f = \theta(1-\gamma)^{\frac{[(1-\gamma)(2A-d)+1]}{(\gamma\varepsilon+(1-\gamma))}} \quad c_m = (1-\theta)(1-\gamma)^{\frac{[(1-\gamma)(2A-d)+1]}{(\gamma\varepsilon+(1-\gamma))}}$$

Corner solution. In the corner solution, as the gender discrimination level is very high, $d > 2A - \frac{1}{\gamma\varepsilon}$, the marginal gain given by public spending does not compensate for the marginal cost of the latter. Adults vote for a tax rate equal to zero, $\tau = 0$.

The *number of children chosen by the household*,

$$n = \frac{\gamma(2A-d)}{(A-d)\phi}, \tag{23}$$

13. The establishment of gender discrimination only takes into account the disadvantage of women on the labor market and not the possible advantage of men.

is positively associated with gender discrimination, $\frac{\partial n}{\partial d} > 0$. A higher level of gender discrimination encourages fertility. The price effect outweighs the income effect as there is no indirect price effect which plays through shifts in public spending. This result coincides with the literature which specifies that childbearing decisions are negatively linked to female wages (Del Boca and Locatelli (2007); De Tray (1973)).

If there is a U-shaped relationship between fertility and discrimination, which means $\varepsilon > (1 + \frac{1}{2A(1-\gamma)})$, this solution will be located in the increasing part of the U-shaped curve. The gender discrimination level still has a negative impact on the female labor supply, $t_f = 1 - \frac{\gamma(2A-d)}{(A-d)}$.

Individual consumptions are still negatively correlated with the discrimination level. A higher discrimination level reduces the household income for a fixed working time and decreases individual consumptions,

$$c_f = \theta(1-\gamma)(2A-d) \quad \text{and} \quad c_m = (1-\theta)(1-\gamma)(2A-d)$$

To sum up, gender discrimination, by acting on wages, modifies the allocation of tasks within the household (see Table 2). If discrimination is not too high, its increase raises the cost of having children and couples put off childbearing. Beyond a discrimination threshold there is an inversion of this relationship and households have more children. As gender discrimination reduces the female wage, its increase discourages the entry of women into the labor market. By remaining at home for longer, the female demand for public services decreases and spouses vote for a lower tax rate.

3 Concluding Remarks

In this paper the relationships between gender discrimination and household decisions have been presented. The model shows that different levels of gender discrimination may explain divergences in household decisions across countries. The solution shows a U-shaped relationship between fertility and gender discrimination if the efficiency in public spending is sufficiently high. A drop in the discrimination level may lead to a related rise in fertility, women's employment and family policies. These results match the positive correlation between childbearing and women's labor supply which has been observed since the mid-1980s in OECD countries. The model also shows that if gender discrimination is very high, the marginal gain given by public spending does not compensate for the marginal cost of the latter, so agents vote for a tax rate equal to zero. Finally, the role

played by preferences is also analyzed in the current paper.

Some extensions of this paper can be proposed. First, heterogeneity may be introduced within preferences. If men and women display different preferences there is no consensus concerning the expected tax rate within the society as individuals of each gender groups have different preferred tax rates. In this context, a political process represented as a probabilistic voting model may be used in the first stage (Lindbeck and Weibull (1987); Persson and Tabellini (2000)). Second, discrimination can be analyzed as a social norm which differs from country to country (Fernandez and Sevilla-Sanz (2006)). Another potential extension could be to study the dynamic of the model by modeling, for instance, an overlapping generation structure. In a dynamic perspective, the depreciation of human capital due to specialization in domestic activities for women would influence household decisions as it would affect both the gender wage gap and spouses' bargaining power. An econometric analysis may also be done to test the relevance of this model.

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Appendices

A Tax rate determination

First order condition of the maximization of spouses' indirect utilities:

$$\frac{\gamma\varepsilon}{(1+g)} - \frac{(1-\gamma)}{(1-\gamma)(w_f+w_m)-g} = 0 \tag{A.1}$$

From this condition the expression of public spending can be found,

$$g = \frac{[\gamma\varepsilon(w_f + w_m) - 1](1-\gamma)}{(\varepsilon\gamma + 1 - \gamma)} \tag{A.2}$$

and also the time devoted by women to each child:

$$h(g) = \phi[\frac{\gamma\varepsilon[1 + (w_f + w_m)(1-\gamma)]}{(\varepsilon\gamma + 1 - \gamma)}]^{-\varepsilon} \tag{A.3}$$

B Proof of Proposition 1

In order to analyze the effect of discrimination on fertility, we compute the derivative of fertility function in relation to discrimination:

$$\frac{\partial n(d)}{\partial d} = \frac{Z[1 + (1-\gamma)(2A-d)]^{\varepsilon-1}[[1 + (1-\gamma)(2A-d)]A - (2A-d)\varepsilon(1-\gamma)(A-d)]}{(A-d)^2} \tag{B.1}$$

$$\text{with } Z = \frac{\gamma(\gamma\varepsilon)^{\varepsilon}}{\phi(\varepsilon\gamma + 1 - \gamma)^{\varepsilon}} \tag{B.2}$$

$$\frac{\partial n(d)}{\partial d} < 0 \text{ feasible } \Leftrightarrow \varepsilon > (1 + \frac{1}{2A(1-\gamma)}) \text{ with } d \in [0, A[\tag{B.3}$$

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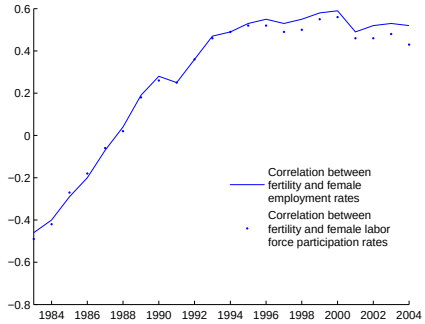


Figure 1. Correlation between fertility rates and female activity rates (line) and between fertility rates and female labor participation rates (dashed line)

Source: These correlations have been calculated for ten European countries: Austria, Denmark, France, Germany, Greece, Ireland, Italy, Portugal, Spain and the United Kingdom. Data come from the OECD database.

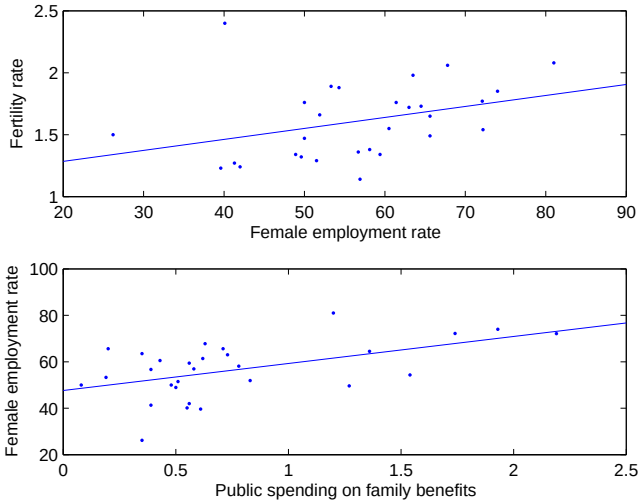


Figure 2. Family Decisions in OECD countries in 2000

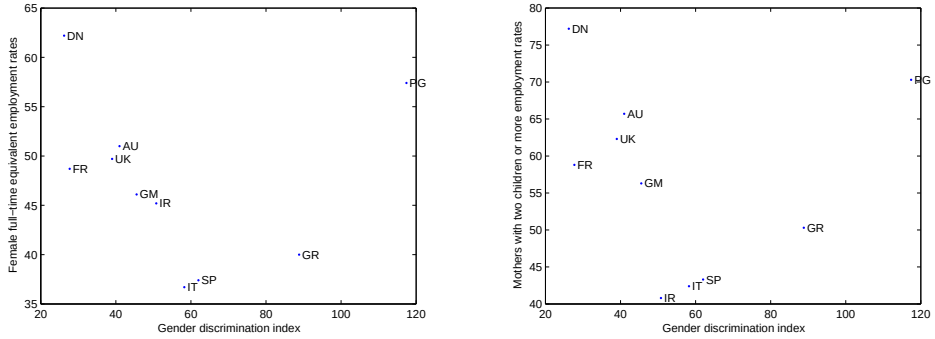
Source: Total fertility rates correspond to the number of children aged 15 to 49 years old per woman. Female employment rates are those for persons aged 15-64 years. Public spending on family benefits is family spending on services percentage of GDP. The data come from the OECD database. All OECD countries are taken into account except Turkey.

Table 1. Gender Discrimination Index in 2000

Countries	Part of the Gender Wage Gap Unexplained by Gender Differences in Characteristics(%)
Denmark	26,24
France	27,72
United Kingdom	39,01
Austria	40,98
Germany	45,53
Ireland	50,78
Italy	58,25
Spain	62,02
Greece	88,84
Portugal	117,44

Table 2. Discrimination effects on household decisions

τ	t_f	n
$(-)$	$(-)$	U-shaped if $\varepsilon > (1 + \frac{1}{2A(1-\gamma)})$
		$(+)$ if $\varepsilon < (1 + \frac{1}{2A(1-\gamma)})$



(a) Female full-time equivalent

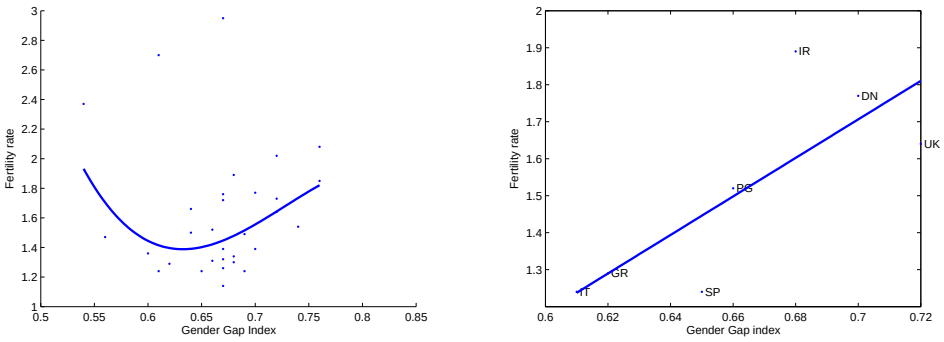
(b) Female with two or more children

(c) Fertility Rate

(d) Family-friendly Policies

Figure 3: Relations with Gender Discrimination Index

Source: Female employment rates of women with two ore more children are those for persons aged 25-54 years. Data come from the OECD database. Female full-time equivalent employment rates is calculated by dividing the full-time equivalent employment by the total population in 15-64 age-group. Full-time equivalent employment is defined as total hours worked divided by the average annual number of hours worked in full-time jobs. Data come from European Commission, 2004.



(a) (b)

Figure 4: Fertility rate and gender inequalities index in 2000

Source: Fertility rates are coming from the World Bank. The gender gap index comes from Hausmann et al. (2009). This index is defined between 0 and 1 scale with $0 = inequality$ and $1 = equality$. In Figure 5(a) countries selected correspond to those for which the index is available in 2000 including Australia, Belgium, Canada, Croatia, Czech Republic, Denmark, Finland, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea Rep., Latvia, Lithuania, Mexico, The Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, The United Kingdom.